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THE CLIMBING PLANTS OF NORTHERN TELANGANA IN INDIA AND THEIR ETHNOMEDICINAL AND ECONOMIC USES

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ABSTRACT

The medicinal and economic uses of climbing plants of five northern districts of Telangana, southern India are documented in the survey during 2008-2011. The climbers enumerated represent 204 specific and infra-specific taxa pertaining to 132 genera of 50 angiosperm families and two ferns. The climbing plants are of nine types of which the most dominant are twiners (55.39%), followed distantly by tendril climbers (19.12%), scramblers (15.68%) and branch climbers (4.90%). Far less in numbers (2-1%) are root climbers (1.47%), leaf climbers, hook climbers and watch-spring climbers (0.98%), and petiole climbers (0.50%). Of the climbers enumerated, 76% are wild and the rest either cultivated or naturalized. Northern Telangana proved to be a potential botanical province of a natural resource through climbers which are being used as medicinal plants, edibles, fodder, fiber, bio-fencing elements, insect repellants and ornamentals.

Key Words: *Climbers, Ethnomedicine, Economic Use, Northern Telangana*

INTRODUCTION

Climbers are plants rooted in the ground but need support for their weak stems (Richards, 1952). The climbers, in the wild, generally utilize the neighbouring plants as external supporting structures to ascend (den Dubbelden and Oosterbeek, 1995). The early and somewhat sound classification of climbers is that of Schimper (1903) who categorized them into scrambles, root climbers, twiners and tendril climbers. The term 'vine' is often used synonymous with climber while 'liana' or 'liane' is usually devoted to woody climbers (Kelly, 1985). Success in encountering suitable supports and ascending them effectively will be a major constraint for the performance of climbers in their natural habitat (Wilmanns, 1983; Putz, 1984). To grab support, the climbing plants use different climbing modes and attachment mechanisms such as tendrils, thorns, spines and hooks. Several of species are stem-twinning while some others climb with the help of aerial adventitious roots. The tendrils developed are of various sizes and derived from a variety of structures like stems, branches, petioles, stipules, leaflets and inflorescence.

In tropical forests, the lianas exhibit diverse patterns of pollination, dispersal and phenological systems apart from providing several material resources and playing a crucial role in the maintenance of biological diversity (Reddy and Parthasarathy, 2006). The species diversity and abundance of lianas depend upon several key abiotic factors which include total precipitation, seasonality of rainfall, soil fertility and disturbance (Londre and Schnitzer, 2006). Besides, the climbers are part of life-form [biological] spectra of forest ecosystems. The ecological significance of lianas is an acknowledged fact due to the vital role they play through direct and indirect competition with trees in the functioning of the forest ecosystem, being key components of whole forest transpiration, forest regeneration and carbon sequestration (Schnitzer and Bongers, 2002).

The recent studies on lianas have brought out the significance of the life-form to: (i) the overall density and species diversity of tropical forests (Rice *et al.*, 2004), (ii) the mechanisms by which they change the tropical forest diversity and regeneration process (Schnitzer and Carson, 2001), (iii) how they harm certain shade-tolerant species (sciophytes) while promoting the growth of some pioneer species (Toledo-Aceves and Swaine, 2007), (iv) by their contribution to high aboveground biomass, carbon sequestration, forest transpiration, and (v) as provider of essential food to many a forest animals (Restom and Nepstad,

Research Article

2001; Schnitzer and Bongers, 2002; Reddy and Rao, 2007), nectar to pollinators, etc. The climbers are currently considered as important constituent of Non-Timber Forest Products (NTFPs). There are no comprehensive studies assessing the role of climbers in Indian forests in the health management and economic subsistence of local people. In the light of this fact, the ethnomedicinal and economic uses of climbers are being surveyed and enumerated for the first time for the region of northern Telangana, southern India. The hill ranges in the region are not part of Eastern Ghats. The present paper has the objectives of (i) enumerating the climbers which include the indigenous/exotic and wild/cultivated/naturalized species, (ii) classifying every ascending species encountered as per their climbing mode, and (iii) providing the vernacular/s, ethnic and economic uses of these species. The data are also intended to serve as baseline information for change detection of attitude of people towards the utilization of this life-form in the region.

Study Area

The study area lies in the latitudes 16°45' to 19°55' N and longitudes 77°28' to 80°47' E (Figure 1). It is bounded in the north by Yeotmal and Chanda districts of Maharashtra, in east-west and east by Godavari River, southeast by Krishna, south by Nalgonda, southwest by Medak districts, and west by Bidar district of Karnataka and Nanded district of Maharashtra. It occupies a geographical area of 64,783 sq km (Adilabad-16,128 sq km + Nizamabad-7,956 sq km + Karimnagar-11,823 sq km + Warangal-12,847 sq km + Khammam-16,029 sq km). It constitutes 23.55% of the total geographic area of Andhra Pradesh state.

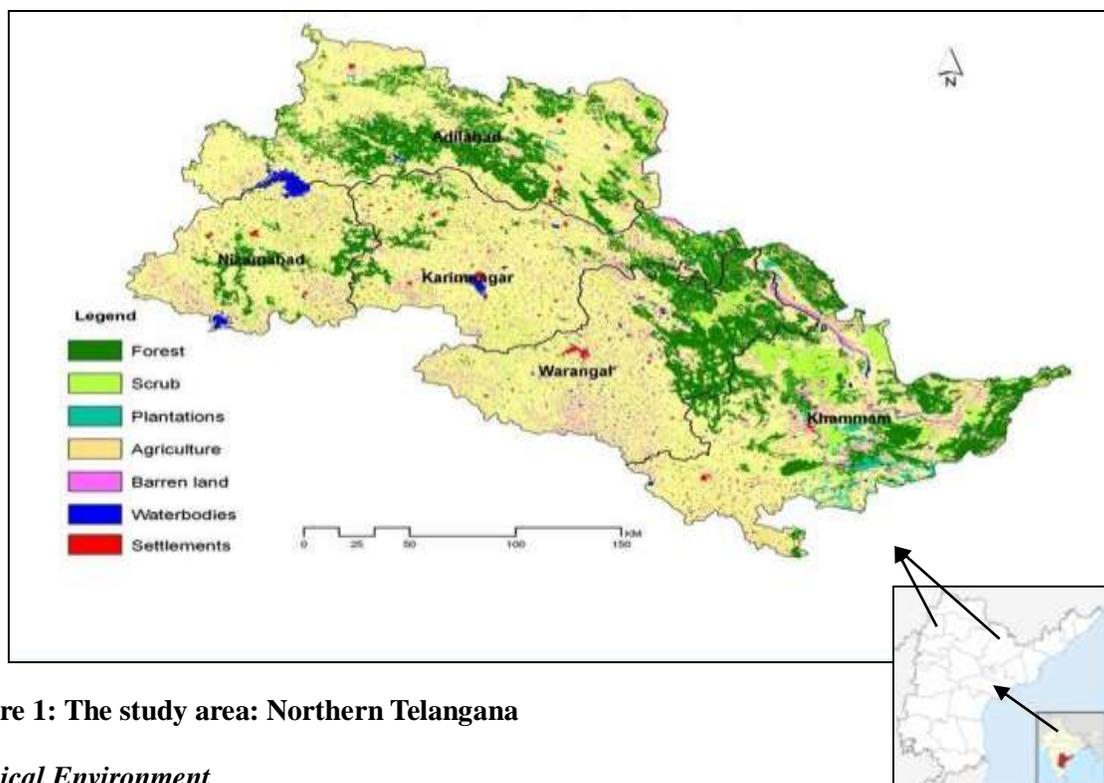


Figure 1: The study area: Northern Telangana

Physical Environment

The study area receives annual rainfall of 800-1200 mm through south-west (June-September) and north-east (October-December) monsoons though 80-85% of precipitation will be usually from the former. The study area is very warm and dry during summer (March-June). The habitat continues to be warm during the rest of the year while the temperature rises up to 50°C in summer.

Biological Environment

Northern Telangana has a forest cover of 19,741 sq km (FSI, 2011). It is spread over 17 forest divisions, namely Adilabad, Bellampally, Jannaram, Kagaznagar, Mancherial and Nirmal divisions of Adilabad

Research Article

district, Nizamabad and Kamareddi of Nizamabad district, Karimnagar East and Karimnagar West of Karimnagar district, Warangal North and Warangal South of Warangal district and North Bhadrachalam, South Bhadrachalam, Khammam, Kothagudem and Paloncha divisions of Khammam district. There are seven wildlife sanctuaries included. The study area inhabits 11 indigenous ethnic groups in the agency areas viz. Gonds, Koyas, Konda Reddis, Kolams, Naikpods, Pardhans (Pradhans), Thotis, Mannewars, Dadve, Gowari and Raj Koyas. The total tribal population is 1,689,519, including the Yerukalas of non-forest areas and the Lambadis, non-local settlers of both non-forest and forest areas (Anonymous, 2001).

MATERIAL AND METHODS

The survey covered the forests and ethnic villages of Adilabad, Nizamabad, Karimnagar, Warangal and Khammam districts of northern Telangana when the Vegetation Carbon Pool Project (2008-2011) was operated. The data related to the economic and medicinal plant resources were gathered through free discussions with local people, interviewing the indigenous doctors (*natu* Vaidyas), elderly people, homemakers, mid-wives, cattle owners and shepherds. The voucher specimens of the climbers used were collected and identified with the help of floras (Gamble and Fischer, 1915-1935), e-floras, etc. The specimens were processed, mounted on sheets and deposited at Kakatiya University Herbarium, Warangal (KUW). The field trips were made to cover the four seasons of the year.

RESULTS AND DISCUSSION

The climbing plants in temperate forests make-up 7% of the regional flora while their species richness in the tropical forests attains 20% (Gentry, 1991). Most of the tropical Magnoliophyte climbers largely belong (alphabetically) to Apocynaceae (incl. Asclepiadaceae), Combretaceae, Convolvulaceae, Cucurbitaceae, Mimosaceae, Oleaceae, Papilionaceae (excl. Caesalpiniaceae and Mimosaceae), Rhamnaceae and Vitaceae of Magnoliopsida, Araceae and Dioscoreaceae of Liliopsida. Conversely, the climbing habit has evolved independently in genetically unrelated angiosperm families. And, the climbers are found in almost all vegetation types besides the human-made agricultural and horticultural landscapes. However, the climbers are found to be more diverse and abundant in disturbed forest sites as they better utilize the gaps and the sunlight, perhaps the climate change. A total of 204 climbing species and infraspecific taxa with Telugu vernacular/s, mode of climbing, medicinal and economical uses are documented for northern Telangana in the survey during 2008-2011 (Table 1). The Papilionaceae are the most dominant family with 29 taxa (+ 2 of Caesalpiniaceae and 4 of Mimosaceae; a total of 35 for Leguminosae/Fabaceae), closely followed by Convolvulaceae (27), Apocynaceae (26), Cucurbitaceae (23) and then Vitaceae (13). Besides, there were found two climbing ferns (*Cyclosorus unitus* of Thelypteridaceae and *Lygodium flexuosum* of Lygodiaceae) along the streams in the dry deciduous forests of Khammam and Warangal districts.

Acevedo-Rodriguez (2005) described the ascending plants of Puerto Rico and Virgin islands as ‘vines’ (herbaceous climbers, with limited secondary growth) and ‘climbing plants’ (lianes, the woody species). Although Ghosh (2013) begins his article on the climbers of North Andaman Islands classifying them into herbaceous and woody (lianes), he was consistent in treating them thereafter as climbers and lianes. Reddy and Rao (2007) enlisted the lianas of Eastern Ghats and conceived all kinds of climbers (including herbaceous) as of (synonymous with) lianes. They reported 149 angiosperm species for the entire stretch of Eastern Ghats under four categories, namely twiners, tendril climbers, stragglers and hook climbers. Muthumperumal and Parthasarathy (2009) distinguished the angiosperm climbers of southern Eastern Ghats on habit into herbaceous and wood vines and further classified them into six types on the basis of climbing mode, viz. Tendril, Root and Hook climbers and Stem twiners, Armed and Unarmed stragglers. On the contrary, Ghosh (2013) classified the climbers of North Andaman Islands into six types, three each of Twiners (stem, branch and spiny) and Climbers (tendril, hook and root). Obviously, there is no unanimity or consistency in the literature on the classification of ascending plants. So, there is a need for a comprehensive classification of this invasive life-form.

Research Article

Table 1: Ethnomedicinal and economic uses of climbing plants of northern Telangana, India

	Family/Vernacular/Scientific name	Habit	Wild/Cult	Plant part used
Acanthaceae				
1	Lavana valli- <i>Asystasia gangetica</i>	BC	Wild	Whole plant: fodder, leafy vegetable, rheumatism
2	Anthrinta- <i>Blepharis maderaspatensis</i>	BC	Wild	Leaf: purgative, fodder
3	Nallakandla pula teega- <i>Thunbergia alata</i> *	TW	Cult/Natur	Leaf: bone fracture, head ache
Amaranthaceae				
4	Konda pindi- <i>Aerva scandens</i>	BC	Wild	Root: dysentery
Annonaceae				
5	Teega sampangi- <i>Artabotrys hexapetalus</i>	HC	Cult	Leaf: fertility; flowers scented
Apocynaceae				
6	Allamanda teega- <i>Allamanda cathartica</i> *	SC	Cult	Flowers: ornamental
7	Atukudu teega- <i>Anodendron paniculatum</i>	TW-L	Wild	Bark: bone fracture
8	Kalimi- <i>Carissa carandas</i>	SC	Wild/Cult	Young fruit: vegetable
9	Vaaka- <i>Carissa spinarum</i>	SC	Wild	Young fruit: vegetable
10	Dusari manda - <i>Ceropegia hirsuta</i>	TW	Wild	Tuber: diarrhoea
11	Rubberu teega - <i>Cryptostegia grandiflora</i> *	TW	Natur	Leaf: toxic
12	Maredu gadda - <i>Decalepis hamiltonii</i>	TW-L	Wild	Tuberous root: prickled, made <i>surbath</i> , tonic
13	Bandi gurija- <i>Dregea volubilis</i>	TW-L	Wild	Leaf: rheumatism, snake-bite
14	Poda patri- <i>Gymnema sylvestre</i>	TW	Wild	Leaf powder: diabetes
15	Sugandhi pala- <i>Hemidesmus indicus</i>	TW	Wild	Root: tonic, cooling
16	Barre sugandhi pala - <i>Hemidesmus indicus</i> var. <i>pubescens</i>	TW	Wild	Root: diabetes
17	Pala gurugu - <i>Holostemma ada-kodien</i>	TW	Wild	Root: mouth ulcers
18	Nalla teega- <i>Ichnocarpus frutescens</i>	TW	Wild	Root: diabetes
19	Mukku tummudu teega- <i>Leptadenia reticulata</i>	TW	Wild	Whole plant: aphrodisiac
20	Jaka teega- <i>Marsdenia tenacissima</i>	TW	Wild	Leaf: purgative
21	Dudi pala, chandra valli - <i>Oxystelma esculentum</i>	TW	Wild	Whole plant: galactogogue
22	Pulla pala, chekruti teega- <i>Pentatropis capensis</i>	TW	Wild	Root: gonorrhoea; leaf: antitumer
23	Bhudari teega - <i>Pentasachme fasciculatum</i>	TW	Wild	Root, leaf: rat poison
24	Dustapu teega- <i>Pergularia daemia</i>	TW	Wild	Leaf: stomach ache
25	Pulla kaadalu - <i>Sarcostemma acidum</i>	BC	Wild	Whole plant: burns; bone fracture
26	Teega jemudu- <i>Sarcostemma intermedium</i>	BC	Wild	Stem: emetic
27	Pala teega- <i>Sarcostemma secamone</i>	BC	Wild	Resin: galactogogue
28	Konda pala - <i>Secamone emetica</i>	TW	Wild	Fruit: emetic
29	Konda malle teega- <i>Telosma pallida</i>	TW	Wild	Root: galactogogue
30	Mekameyani aku- <i>Tylophora indica</i>	TW	Wild	Stem: urinary troubles; leaf: asthma
31	Nitya/naga malle- <i>Vallisneria spiralis</i> *	TW-L	Cult	Latex: wounds

Research Article

	Araceae			
32	Salava gadda - <i>Lasia spinosa</i>	RC	Wild	Rhizome: body pains, cooling, throat infections
	Arecaceae			
33	Sapa barige teega- <i>Calamus rotang</i>	SC	Wild	Young shoots: vegetable; cane: furniture
	Aristolochiaceae			
34	Nalleswari- <i>Aristolochia bracteolata</i>	TW	Wild	Whole plant: purgative
35	Gadida gadapa- <i>Aristolochia indica</i>	TW	Wild	Root: snake-bite
	Asparagaceae			
36	Guddelugu bochu- <i>Asparagus gonocladus</i>	SC	Wild	Tuber: aphrodisiac
37	Pilli teegalu- <i>Asparagus racemosus</i>	SC	Wild	Tuber: aphrodisiac
	Asteraceae			
38	Thotala mahamari- <i>Chromolaena odorata</i> *	SC	Natur	Whole plant: skin ailments
39	Tera teega - <i>Taremonnia elliptica</i> *	SC	Cult	Curtain creeper
	Basellaceae			
40	Batchali- <i>Basella alba</i> *	TW	Cult/Natur	Leaf: vegetable
	Bignoniaceae			
41	Trumphet vine - <i>Podranea ricasoliana</i> *	SC	Cult	Flowers: ornamental
42	Teega Tecoma - <i>Tecoma capensis</i> *	SC	Cult	Flowers: ornamental
	Caesalpiniaceae			
43	Addaku- <i>Bauhinia vahlii</i>	TW-L	Wild	Leaves: meal plates; young fruits: eaten, vegetable
44	Gachakaya- <i>Caesalpinia bonduc</i>	SC	Wild	Whole plant: live fence: seeds: ephemeral fevers, playing
	Capparaceae			
45	Nalla uppi- <i>Capparis sepiaria</i>	SC	Wild	Whole plant: skin troubles
46	Aadonda- <i>Capparis zeylanica</i>	SC	Wild	Fruit: diabetes; root: dyspepsia
47	Putta teega- <i>Maerua oblongifolia</i>	SC	Wild	Leaf: diabetes
	Celastraceae			
48	Malleru teega- <i>Celastrus paniculatus</i>	SC	Wild	Stem bark: abortifacient
49	Danthi- <i>Maytenus emarginata</i>	SC	Wild	Tender shoots: mouth ulcers
	Combretaceae			
50	Bontha teega- <i>Combretum albidum</i>	TW-L	Wild	Root bark: veterinary (wounds)
51	Yadaku- <i>Combretum decandrum</i>	TW-L	Wild	Leaf: paste boils and blisters: stem: rope; seed: eczema
52	Rangoon malle- <i>Combretum indicum</i> *	TW-L	Cult	Root, seed: antihelmintic
53	Yada teega- <i>Combretum latifolium</i>	TW-L	Wild	Stem bark: insecticide
54	Bontha- <i>Gitonia floribunda</i>	TW-L	Wild	Leaf: scorpion bite
	Convolvulaceae			
55	Samudra pala- <i>Argyreia nervosa</i>	TW-L	Wild	Stem: wounds; leaf: skin ailments
56	Pashi teega- <i>Cuscuta chinensis</i> *	TW	Natur	Whole plant: galactogogue

Research Article

57	Lanja savaram- <i>Cuscuta reflexa</i>	TW	Wild	Whole plant: purgative
58	Tooti kura - <i>Ipomoea aquatica</i>	TW	Wild	Tender leaves: vegetable
59	Suvarcharla- <i>Ipomoea barlerioides</i>	TW	Wild	Leaf: mouth wash
60	Kanda gadda - <i>Ipomoea batatas*</i>	TW	Cult	Tuber: vegetable
61	Elika chevi- <i>Ipomoea eriocarpa</i>	TW	Wild	Root: stomach ache
62	Kasiratnamu- <i>Ipomoea hederifolia</i>	TW	Wild	Root: tonic
63	Pappu charu teega- <i>Ipomoea mauritiana</i>	TW	Wild	Root: aphrodisiac
64	Kolli teega- <i>Ipomoea nil</i>	TW	Wild	Whole plant: ulcers; flowers: worship
65	Macha aku- <i>Ipomoea obscura</i>	TW	Wild	Leaf: stomach ache, insect bite
66	Balabandhi teega- <i>Ipomoea pes-caprae</i>	TW	Wild	Leaf: rheumatism
67	Puli adugu teega- <i>Ipomoea pes-tigridis</i>	TW	Wild	Whole young plant: fodder
68	Tarulata- <i>Ipomoea quamoclit*</i>	TW	Cult/Natur	Leaf: hemorrhoids
69	Puriti teega- <i>Ipomoea sepiaria</i>	TW	Wild	Whole plant: fodder
70	Teenta teega - <i>Ipomoea staphylina*</i>	TW	Natur	Stem: binding thread
71	Matta pala teega - <i>Jacquemontia paniculata*</i>	TW	Cult	Flowers: ornamental
72	Eluka chevvu aku- <i>Merremia aegyptiaca</i>	TW	Wild	Leaf: jaundice
73	Badam teega - <i>Merremia dissecta</i>	TW	Natur	Leaf: cold
74	Yelaka jeevaku- <i>Merremia gangetica</i>	TW	Wild	Leaf: rheumatism; neuralgia
75	Talantu teega- <i>Merremia hederacea</i>	TW	Wild	Fruit: hair wash
76	Pancha udaya prakashi - <i>Merremia quinquefolia*</i>	TW	Wild	Seeds: sedative
77	Sitha savaram- <i>Merremia tridentata</i>	TW	Wild	Whole plant: rheumatism, piles
78	Soorapu teega- <i>Merremia tridentata ssp. hastata</i>	TW	Wild	Root: tooth-ache
79	Darugulabee pula teega, <i>Merremia tuberosa*</i>	TW	Cult/Natur	Root: purgative; fruit: ornamental
80	Tagada- <i>Operculina turpethum</i>	TW	Wild	Whole plant: purgative
81	Boddi kura- <i>Rivea hypocrateriformis</i>	TW	Wild	Root: snake bite
	Cordiaceae			
82	Pedda iriki, pedda bothuku- <i>Cordia wallichii</i>	SC	Wild	Fruit: edible, pickle
	Cucurbitaceae			
83	Budida gummadi- <i>Benincasa hispida</i>	TC	Cult	Young fruit: vegetable, ripe: made cakes, sweets
84	Verri pucha- <i>Citrullus colocynthis*</i>	TC	Natur	Root: antidote
85	Kaki donda, Donda- <i>Coccinea grandis</i>	TC	Wild/Cult	Leaf: diabetes; unripe fruit: vegetable
86	Naga donda- <i>Corallocarpus epigaeus</i>	TC	Wild	Root: dysentery
87	Gargoo - <i>Ctenolepis garcinii</i>	TC	Wild	Whole plant: throat disorders
88	Pam budum- <i>Cucumis callosus</i>	TC	Wild	Root: indigestion
89	Karbooja- <i>Cucumis melo</i>	TC	Cult	Fruit: edible
90	Dosa- <i>Cucumis sativus</i>	TC	Cult	Fruit: edible
91	Gummadi- <i>Cucurbita pepo</i>	TC	Cult	Fruit: vegetable

Research Article

92	Linga donda- <i>Diplocyclos palmatus</i>	TC	Wild	Leaf: rheumatism; fruit: diarrhoea
93	Aanige kaya- <i>Lagenaria siceraria</i>	TC	Cult	Fruit: vegetable
94	Beera- <i>Luffa acutangula</i>	TC	Cult	Fruit: vegetable
95	Nethi beera- <i>Luffa aegyptiaca</i>	TC	Wild	Fruit: jaundice; sponge
96	Kuthuru budama - <i>Melothria leiosperma</i>	TC	Wild	Leaf: allergy
97	Noogu dosa - <i>Melothria maderaspatana</i>	TC	Wild	Root: tooth-ache
98	Kakara- <i>Momordica charantia</i>	TC	Cult	Unripe fruit: vegetable
99	Boda kakara- <i>Momordica dioica</i>	TC	Wild/Cult	Unripe fruit: vegetable
100	Adavi donda- <i>Solena amplexicaulis</i>	TC	Wild	Leaf: spermatorrhoea
101	Potla - <i>Trichosanthes anguina</i>	TC	Wild	Unripe fruit: vegetable
102	Chedu potla - <i>Trichosanthes cucumerina</i>	TC	Wild	Whole plant: ear-ache
103	Avva pandu- <i>Trichosanthes tricuspidata</i>	TC	Wild	Fruit: ear-ache
104	Mysuru budama - <i>Zehneria mysorensis</i>	TC	Wild	Root: diarrhoea
105	Bidda buduma - <i>Zehneria scabra</i>	TC	Wild	Root: tooth-ache
Dioscoreaceae				
106	Bellam gadda- <i>Dioscorea alata</i>	TW	Cult	Tuber: vegetable
107	Chenna gadda- <i>Dioscorea bulbifera</i>	TW	Wild	Tuber: vegetable; sexual vigour
108	Magasiri gadda- <i>Dioscorea hispida</i>	TW	Wild	Tuber: vegetable; sexual vigour
109	Yella gadda- <i>Dioscorea oppositifolia</i>	TW	Wild	Tuber: vegetable
110	Govinda gadda- <i>Dioscorea pentaphylla</i>	TW	Wild	Tuber: vegetable; indigestion
Euphorbiaceae				
111	Doola gondi- <i>Tragia involucrata</i>	TW	Wild	Leaf: stomach pain due to Nematodes
112	Dula bendi- <i>Tragia plukenetii</i>	TW	Wild	Root: scorpion bite
Flagellariaceae				
113	Aku ukku/kokkem teega - <i>Flagellaria indica</i>	LC	Wild	Leaf: induce sterility
Lauraceae				
114	Paashi teega- <i>Cassytha filiformis</i>	TW	Wild	Whole plant: burns, hydrocele
Liliaceae				
115	Nabhi - <i>Gloriosa superba</i>	LC	Wild	Tuber: antidote
Linaceae				
116	Kaki beera- <i>Hugonia mystax</i>	SC	Wild	Root: antiinflammatory
Lygodiaceae				
117	Dayyapu jeda- <i>Lygodium flexuosum</i>	TW	Wild	Leaf: skin disease
Malphiaceae				
118	Madhavi lata- <i>Hiptage benghalensis</i>	TW-L	Wild	Leaf: fodder
119	Bandikota teega- <i>Aspidopterys cordata</i>	TW-L	Wild	Stem: binding thread

Research Article

Menispermaceae					
120	Visha boddi- <i>Cissampelos pareira</i>	TW	Wild	Root: cardiac stimulant; whole plant: snake bite	
121	Adavi banka teega- <i>Cissampelos pareira</i> var. <i>hirsuta</i>	TW	Wild	Tuber: chest pain	
122	Doosara teega- <i>Cocculus hirsutus</i>	TW	Wild	Leaf: mouth ulcers, leucorrhoea	
123	Tippa teega- <i>Tinospora cordifolia</i>	TW	Wild	Root: bone fracture; stem: aphrodisiac	
Mimosaceae					
124	Korintha- <i>Acacia caesia</i>	SC	Wild	Flower: antimicrobial	
125	Valuga palla chettu- <i>Acacia sinuata</i>	SC	Wild	Fruit: skin disease	
126	Adavi korintha- <i>Acacia torta</i>	SC	Wild	Stem bark: menstrual pain	
127	Atti pathi- <i>Mimosa pudica</i> *	BC	Natur	Root: urinary troubles	
Moraceae					
128	Teega marri - <i>Ficus pumila</i> *	RC	Cult	Fruit: jelly, plant: wall decoration	
Nyctaginaceae					
129	Kagitapu chettu- <i>Bougainvillea spectabilis</i> *	HC	Cult	Leaf: diabetes	
130	Teega atikamamidi - <i>Commicarpus chinensis</i>	BC	Wild	Root: leucorrhoea	
Olacaceae					
131	Turuka toppe, Muriki malle- <i>Olax scandens</i>	SC	Wild	Stem bark: anaemia	
Oleaceae					
132	Uppu kampa- <i>Azima tetracantha</i>	SC	Wild	Root: rheumatism	
133	Mollalu, adavimalle- <i>Jasminum auriculatum</i>	TW-L	Wild	Leaf: tympany	
134	Mulla gundu malle - <i>Jasminum flexile</i>	TW-L	Cult	Whole plant: repellent	
135	Jaaji malle, malathi - <i>Jasminum grandiflorum</i> *	TW-L	Cult	Leaf: mouth ulcer	
136	Vira jaaji- <i>Jasminum multiflorum</i>	TW-L	Cult	Leaf: indolent ulcer	
137	Gundu malle- <i>Jasminum sambac</i>	TW	Cult	Flower: ornamental	
Papilionaceae					
138	Gurija- <i>Abrus precatorius</i>	TW	Wild	Seed: abortifacient	
139	Teega moduga- <i>Butea superba</i>	TW-L	Wild	Stem bark: urinary troubles	
140	Adavi kandi - <i>Cajanus scarabaeoides</i>	TW	Wild	Whole plant: manure	
141	Adavi chikkudu- <i>Canavalia gladiata</i> *	TW	Cult	Seed: vegetable	
142	Adavi chemma- <i>Canavalia nervosa</i>	TW	Wild	Fruit: vegetable	
143	Adavi tamba- <i>Canavalia virosa</i>	TW	Wild	Fruit: vegetable	
144	Dintena teega - <i>Clitoria ternatea</i> *	TW	Wild	Flower: diabetes	
145	Teega patcharu- <i>Dalbergia volubilis</i>	SC	Wild	Bark: skin disease	
146	Nalla teega- <i>Derris scandens</i>	TW	Wild	Leaf: ear-ache; stem bark: veterinary	
147	Munta mandu- <i>Desmodium triflorum</i>	TW	Wild	Whole plant: fodder; leaf: dysentery	
148	Adavi chikkudu - <i>Dolichos trilobatus</i>	TW	Wild	Tubers: edible, skin ailments	
149	Noogu adavi chikkudu - <i>Dysolobium pilosum</i>	TW	Wild	Plant: fodder	

Research Article

150	Chikkudu- <i>Lablab purpureus</i>	TW	Cult	Fruit, seed: vegetable
151	Gulabi chikkudu - <i>Macroptilium atropurpureum*</i>	TW	Cult/Natur	Pasture plant
152	Nela tangedu - <i>Millettia racemosa</i>	TW	Wild	Stem bark: fever
153	Dula dundi - <i>Mucuna pruriens</i> var. <i>hirsuta</i>	TW	Wild	Root: skin disease
154	Dula gondi - <i>Mucuna pruriens</i> var. <i>pruriens</i>	TW	Wild	Leaf: tumors; seed: abortifacient
155	Manchi dulagondi - <i>Mucuna pruriens</i> var. <i>utilis</i>	TW	Wild	Fruit: edible
156	Adavi tella kandi- <i>Paracalyx scariosus</i>	TW	Wild	Whole plant: fodder
157	Lima chikkudu - <i>Phaseolus lunatus</i>	TW	Wild	Leaf: fever; pods: vegetable
158	Batani - <i>Pisum sativum*</i>	TC	Cult	Fruit: vegetable
159	Nayaku ponna- <i>Pseudarthira viscida</i>	TW	Wild	Root: rheumatism
160	Nela gummadi- <i>Pueraria tuberosa</i>	TW	Wild	Tuber: chest pain
161	Nela chikkudu- <i>Rhynchosia minima</i>	TW	Wild	Leaf: abortifacient
162	Adavi kandi- <i>Rhynchosia suaveolens</i>	TW	Wild	Root: weakness
163	Adavi minumulu- <i>Teramnus labialis</i>	TW	Wild	Whole plant: sexual debility
164	Alasandalu- <i>Vigna unguiculata*</i>	TW	Cult	Seed: menstrual disorders
165	Pilli pesalu- <i>Vigna trilobata*</i>	TW	Cult	Whole plant: fodder
166	Mudaga parni - <i>Vigna vexillata*</i>	TW	Natur	Leaf: skin disease
Passifloraceae				
167	Jumiki- <i>Passiflora edulis*</i>	TC	Cult	Flower: ornamental; fruit: edible
168	Pasi jumiki - <i>Passiflora foetida*</i>	TC	Natur	Leaf: head-ache
Periplocaceae				
169	Budda pala teega- <i>Cryptolepis buchananii</i>	TW	Wild	Root: veterinary (galactagogue)
Phyllanthaceae				
170	Pulicheru- <i>Phyllanthus reticulatus</i>	SC	Wild	Leaf: piles, fodder
Piperaceae				
171	Toka miriyalu- <i>Piper sylvestre</i>	RC	Cult	Fruit: liver enlargement
Polygonaceae				
172	Teega rosa- <i>Antigonon leptopus*</i>	TW	Cult/Natur	Tuber: vegetable
Ranunculaceae				
173	Pulla batchali- <i>Naravelia zeylanica</i>	PC	Wild	Leaf: cooling agent
Rhamnaceae				
174	Surati chekka- <i>Ventilago denticulata</i>	SC	Wild	Leaf: skin disease
175	Gali vana teega- <i>Ventilago maderaspatana</i>	SC	Wild	Stem bark: aphrodisiac
176	Pariki- <i>Ziziphus oenoplia</i>	SC	Wild	Stem bark: dysentery
177	Enugu pariki- <i>Ziziphus rugosa</i>	SC	Wild	Leaf: bone fracture
Rubiaceae				
178	Surya bhakta- <i>Paederia foetida</i>	TW	Wild	Leaf: diarrhoea, skin disease

Research Article

Rutaceae					
179	Konda kasinda- <i>Toddalia asiatica</i>	SC	Wild	Root: dog bite	
Sapindaceae					
180	Chinna budda kashe - <i>Cardiospermum halicacabum</i> *	WC	Natur	Leaf: piles	
181	Budda kashe- <i>Cardiospermum halicacabum</i> var. <i>macrocarpum</i>	WC	Natur	Root: laxative, rheumatism	
Smilacaceae					
182	Nageti dumpa- <i>Smilax perfoliata</i>	TW	Wild	Tuber: abortifacient	
183	Firangi mokka- <i>Smilax zeylanica</i>	TW	Wild	Root: leucorrhoea	
Solanaceae					
184	Vakudu- <i>Solanum virginianum</i> *	SC	Natur	Fruit: laxative	
Stemonaceae					
185	Kanepu teega- <i>Stemona tuberosa</i>	TW	Wild	Tuber: fever	
Sterculiaceae					
186	Yerra katla teega - <i>Byttneria herbacea</i>	BC	Wild	Root: swellings	
Thelypteridaceae					
187	Hamsapadi- <i>Cyclosorus unitus</i>	TW	Wild	Whole plant: scorpion bite	
Tiliaceae					
188	Banka jana- <i>Grewia flavescens</i>	SC	Wild	Fruit: edible	
Verbenaceae					
189	Nalla uppi- <i>Clerodendrum inerme</i>	SC	Wild	Leaf: leucorrhoea	
190	Konda takkali- <i>Symphorema involucratum</i>	TW	Wild	Stem bark: improper heat balance	
Vitaceae					
191	Dobba teega- <i>Ampelocissus latifolia</i>	TC	Wild	Stem: anorexia	
192	Lolugu teega- <i>Ampelocissus tomentosa</i>	TC-L	Wild	Fruit: edible	
193	Edakula mandulamari- <i>Cayratia pedata</i>	TC-L	Wild	Leaf: venereal diseases	
194	Kampu teega- <i>Cayratia trifolia</i>	TC	Wild	Root: astringent	
195	Kokkitayaralu- <i>Cissus adnata</i>	TC-L	Wild	Tuber: diuretic	
196	Nalla teega- <i>Cissus pallida</i>	TC-L	Wild	Tuber: wounds	
197	Nalleru- <i>Cissus quadrangularis</i>	TC	Wild	Stem: bone fracture	
198	Nela boddu - <i>Cissus repanda</i>	TC-L	Wild	Stem: potable water	
199	Nalleru draksha - <i>Cissus rotundifolia</i>	TC	Cult/Natur	Leaf: gonorrhoea	
200	Adavi draksha- <i>Cissus vitiginea</i>	TC	Wild	Stem bark: wounds	
201	Chevi bachali - <i>Cyphostemma auriculatum</i>	TC	Wild	Stem bark: snake bite	
202	Barre bachali- <i>Cyphostemma setosum</i>	TC	Wild	Whole plant: dysentery, rheumatism	
203	Draksha- <i>Vitis vinifera</i> *	TC	Cult	Fruit: edible	
Zygophyllaceae					
204	Palleru- <i>Tribulus lanuginosus</i>	BC	Wild	Leaf: venereal diseases	

BC: Branch climber; HC: Hook climber; LC: Leaf climber; PC: Petiole climber; RC: Root climber; SC: Scrambler; TC: Tendril climber; TC-L: Tendril climber-Liana; TW: Twiner; TW-L: Twiner-Liana; WC: Watch-spring climber. *Exotic; Cult: Cultivated; Natur: Naturalized.

Research Article

It is suggested that climbing mechanisms are not the result of phylogenetic relatedness. On the other hand, the patterns are indicative of adaptive evolution in climbing plants and explain partly a clustered phylogenetic structure across certain habitats perhaps by way of ecological filtering of climbing mechanisms (Durigon *et al.*, 2013).

Having not satisfied with the available classifications stated above for the present study, the ascending plants (incl. lianes) are segregated into nine types based on their climbing modes largely after Schimper (1903) and with some modifications contemplated in the present study. They are: (1) Scramblers, (2) Root climbers, (3) Twiners, (4) Tendril climbers, (5) Leaf climbers, (6) Petiole climbers, (7) Branch climbers, (8) Hook climbers, and (9) Watch-spring climbers. This classification is still arbitrary and need to be refined, incorporating the ecological strategies of the climbers to the changing environmental conditions.

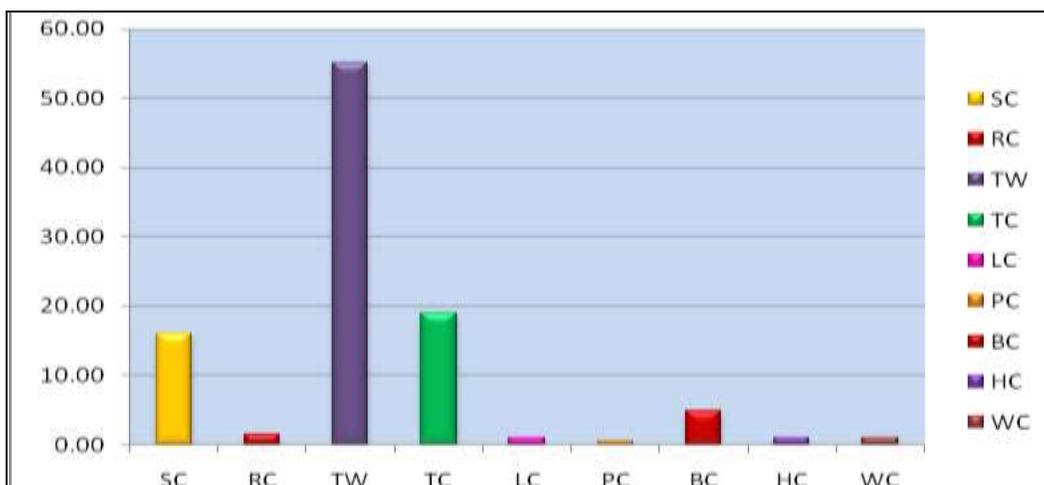


Figure 2: Types of climbers and their proportions in northern Telangana

1. Scramblers (SC): A majority of scramblers are shrubs. These are distinguishable from other shrubs only by their long-straggling branches which support themselves on other branches, without fastening in any active manner. The climbing habit is readily assisted by prickles or thorns, without being able to regard the latter as adaptations to a climbing mode of life (Schimper, 1903). Whilst the majority of scramblers represent the lowest degree of lianes, there are forms with very complete, even if passive, contrivances, as in the case of palm-lianes of the tropical forests, e.g. *Calamus*. There are 32 scramblers (15.68%) found in northern Telangana (Table 1, Figure 2).

2. Root climbers (RC): These form a small group. The representatives grow upwards by means of sub-aerial roots fixed to the support. Vigorous development of fixing-roots is exhibited by many members of Araceae (e.g. *Monstera*, *Philodendron*), Piperaceae (e.g. *Piper*), etc. There are three of them (1.47%) in northern Telangana. One of them is the cultivated and exotic *Ficus pumila* used to carpet the walls.

3. Twiners (TW): The twining plants are greatly stem climbers and their axes grow spirally around slender supports by virtue of their unilateral transverse geotropism, which later on, passes over into negative geotropism (Schimper, 1903). The well-known herbaceous climbers (such as beans, *Aristolochia* spp.) and many lianes are the examples. This is the most dominant type (113 taxa; 55.39%) found in study area.

4. Tendril climbers (TC): The climbing is rendered possible amongst them by the possession of irritable organs, which, when in contact with a support, curl round it. Morphologically, the tendrils are either leaves or axes. Ecologically, they are very varied and though Schenck (in Schimper, 1903) put them into **six groups** on climbing mode. Only the Leaf-tendril climbers (LT) are included here wherein the leaf, or a part of it, is differentiated as a filamentous organ functioning as a tendril, e.g. pea (*Pisum sativum*), members of Cucurbitaceae, Vitaceae, etc., the rest are elevated to the standing of separate types. Examples of tendrillate climbers with the tendrils derived from stipules, branches and inflorescence are all included here. There are 39 such climbing species (19.12%) in the area.

Research Article

5. Leaf climbers (LC): A part of leaf, petiole or blade, of the otherwise unmodified leaf is endowed with the necessary irritability. *Gloriosa superba* and *Flagellaria indica* are the two examples of Liliopsida (Monocot) found (0.98%) in the study area (Table 1). *Asparagus* species found locally are though leaf climbers (hook-like spines are, in fact, modification of leaves), those which climb with lamina part are only included here.

6. Petiole climbers (PC): These climb by twisting the petioles of their leaves around some other ascending source. e.g. *Naravelia zeylanica* (Table 1). However, the species like *Combretum indicum* (*Quisqualis indica*) with hardened petioles, after leaf fall, as hooks with which the plant ascends is placed in twiners.

7. Branch climbers (BC): Like leaf climbers, these represent a low degree of liane. The climbing branches in the least adapted cases differ from ordinary branches by their irritability only, and are provided with lateral shoots and leaves. Only the herbaceous species are included here to distinguish this type from primarily shrubby or woody scramblers, wherein the spines and other accessories are of assistance. There are 10 species of this type (4.90%) in the area.

8. Hook climbers (HC): The climbing organs are metamorphosed thorns or flower-stalks, which, after embracing the support, become considerably thickened. Examples are *Artabotrys hexapetalus* and *Bougainvillea spectabilis* (Table 1), and

9. Watch-spring climbers (WC): These have thin, spirally coiled, bare climbing organs, which, owing to the stimulus of contact, become thicker and harder. They are found in several Rhamnaceae and Sapindaceae. *Cardiospermum halicacabum*, with its two varieties, represents this type.

Floristic composition

In the Dry Deciduous forests of Andamans, Ghosh (2013) found one fern (*Lygodium flexuosum*, Lygodiaceae) and 40 angiosperm climbers. Of these, 25 species (60.97%) are stem twiners, 4 (9.75%) branch twiners, 8 (19.51%) tendril climbers, and the rest (four) are hook climbers. The ratio of woody and herbaceous species was 1 (11 spp.): 2.72 (30 spp.). Further, Ghosh (2013) found the Dicot vs. Monocot climbers in the ratio of 8.7 (218): 1 (25) for North Andaman islands in contrast to 13.5 (189) : 1 (14) for northern Telangana (present study).

In recent studies, from Indian Union, floristic diversity of angiosperm climbers was reported to be: (i) 149 species representing 99 genera of 31 families for the entire Eastern Ghats (Reddy and Rao, 2007); (ii) 175 species which belong to 100 genera and 40 families for southern Eastern Ghats (Muthumperumal and Parthasarathy, 2009) and (iii) 243 species of 143 genera from 46 families for very rich North Andaman island forests (Ghosh, 2013). For northern Telangana, present report enlists 204 specific and infraspecific taxa of climbers which represent 134 genera and 52 families. Relatively, it is good number for a small geographic region.

Ecology

Although there is no ecological assessment of climbers of the habitat intended in the present study, the ecological role of climbers cannot be left out. It is because the climbers are most diverse near the equator (Gentry, 1991) and their abundance generally increases with forest disturbance. As per Stevens (1987), climbers are effective competitors for light and the trees that are heavily climber-laden grow more slowly and show low fecundity (produce fewer fruits and seeds than climber-free trees). The forest managers usually advocate the removal of climbers owing to their generally deleterious effects on trees, at least those growing on future crop trees (Putz, 2012). However, it has been suggested that by growing between tree crowns, lianas help stabilize trees (Smith, 1973). But, the evidence is that liana-infested trees actually create larger gaps when they fall. The local *podu* cultivators are well aware of this phenomenon. They usually use heavily liana-laden trees as “king pins” while clearing the forests.

Tanaka *et al.* (1983) described the ecology of climbing plants in eastern Nepal, with special reference to their altitudinal distribution, life-forms and habitat. The richness and abundance of climbing species was found to vary greatly with the forest type while their abundance positively correlated to soil fertility, length of dry season, and more so with natural and anthropogenic disturbances (Putz and Chai, 1987). The

Research Article

distribution and nature of various climbing plants of central Himalaya (Kumaun) were found to depend largely upon the altitude and temperature (Rawal and Pangtey, 1991).

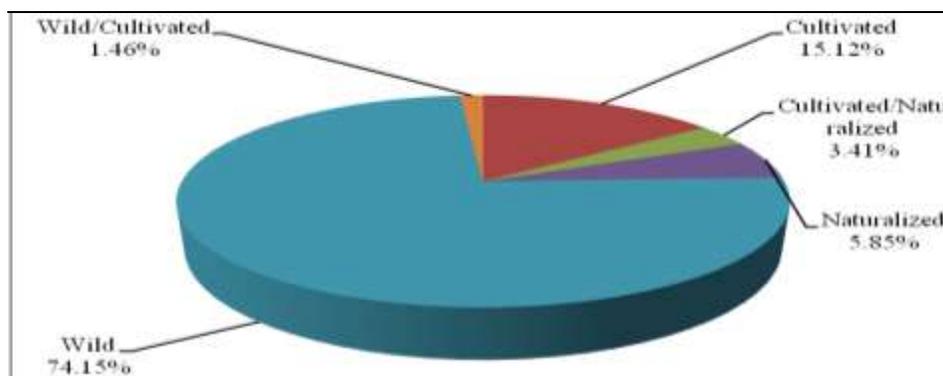


Figure 3: Proportion of wild climbers to those introduced and naturalized

The beneficial role of climbers in forest ecosystems has also to be appraised: (i) the lianas provide important inter-crown pathways for many canopy-dwelling animals and the animals descending to the ground are very susceptible to predation (Emmons and Gentry, 1983, Putz *et al.*, 2001); (ii) the climbers produce abundant leaves, flowers, and fruits which comprise an important feed for animals, and contribute to biogeochemical cycles; (iii) Some climbers produce delicious fleshy fruits or edible seeds or arils that feed many a forest animal; and many canopy lianas also produce abundant flowers for pollinator communities. Of the climber species enumerated, 154 (151 + 3) are wild and wild/cultivated, 38 (31 + 7) are cultivated and cultivated/naturalized) and 12 naturalized (Figure 3). Obviously, 25% of these species are introduced exotic, and on the way of naturalization while some have turned invasive.

Ethnomedicinal and Economic use

The study of diversity of NTFPs and their utilization pattern in Adilabad district (Omkar *et al.*, 2012), so also those on ethno-botanico-medicine for common human ailments in Warangal district (Sreeramulu *et al.*, 2013) and the intracultural cognizance of medicinal plants of Warangal North Forest Division (Suthari *et al.*, 2014) from northern Telangana include some of the climbers presently reported. However, the present documentation does cover the entire northern Telangana (five districts) and includes only those ethnomedicinal and economic uses that were exclusively gathered and not reported earlier. Radha *et al.* (2012) compiled the medicinal uses of 75 climbers from Eastern Ghats. The climbing plants used for different ailments or otherwise in the present study (Table 1) belong to Pteridophyta (2) and Magnoliophyta (202) under Trachaeophyta. The climbing *Gymnosperms* like *Gnetum* spp. are obviously absent from northern Telangana. Of these, 139 (67.8%) are medicinal (incl. 8 [3.9%] ethnoveterinary), 50 economic (24.39%) and 16 (7.81%) medicinal as well as of economic utility (Table 1, Figure 4).

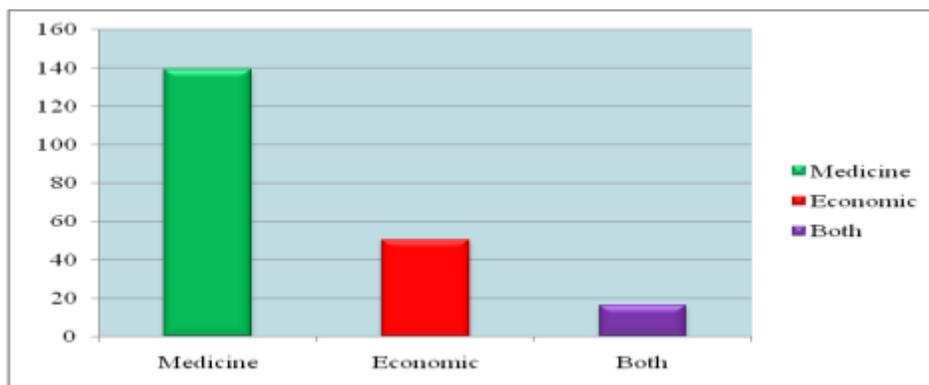


Figure 4: Use-pattern of climbing plants of northern Telangana

Research Article

Conclusions

There are a good number of climbers in the dry and semi-dry deciduous forests and agro-, rural and urban ecosystems of northern Telangana. Many climber species are added to the floristic composition of the region through deliberate human introduction for ornamental and economic purposes. There are escapes from cultivation and running wild or naturalized while some climbers turned invasive. These are to be watched of their deeper entry into the natural ecosystems of the region. The present study, however, reports two new additions to the flora, one for Telangana (*Flagellaria indica*) and another for Andhra Pradesh (*Dysolobium pilosum*), both were collected from Warangal district and from natural forest. The climbing plants have an obvious role to play, apart from ecological, in the health and economics of local people. There is a need to document the threats to local deciduous forests due to invasive climbers with increasing biotic interference and climatic change.

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